

The accredited security level of this system is: TOP SECRET//SI-GAMMA/TALENT KEYHOLE//ORCON/PROPIN
/RELIDO/REL TO USA, FVEY *
TOP SECRET//SI//REL TO USA, FVEY

(U) LONGHAUL

From WikiInfo

(TS//SI/REL) The **LONGHAUL** system provides the **Extended NSA Enterprise** with an end-to-end attack orchestration and key recovery service for Data Network Cipher (DNC) and Data Network Session Cipher (DNSC) traffic. LONGHAUL is extensible to allow for the addition of other Digital Network Intelligence cipher types.

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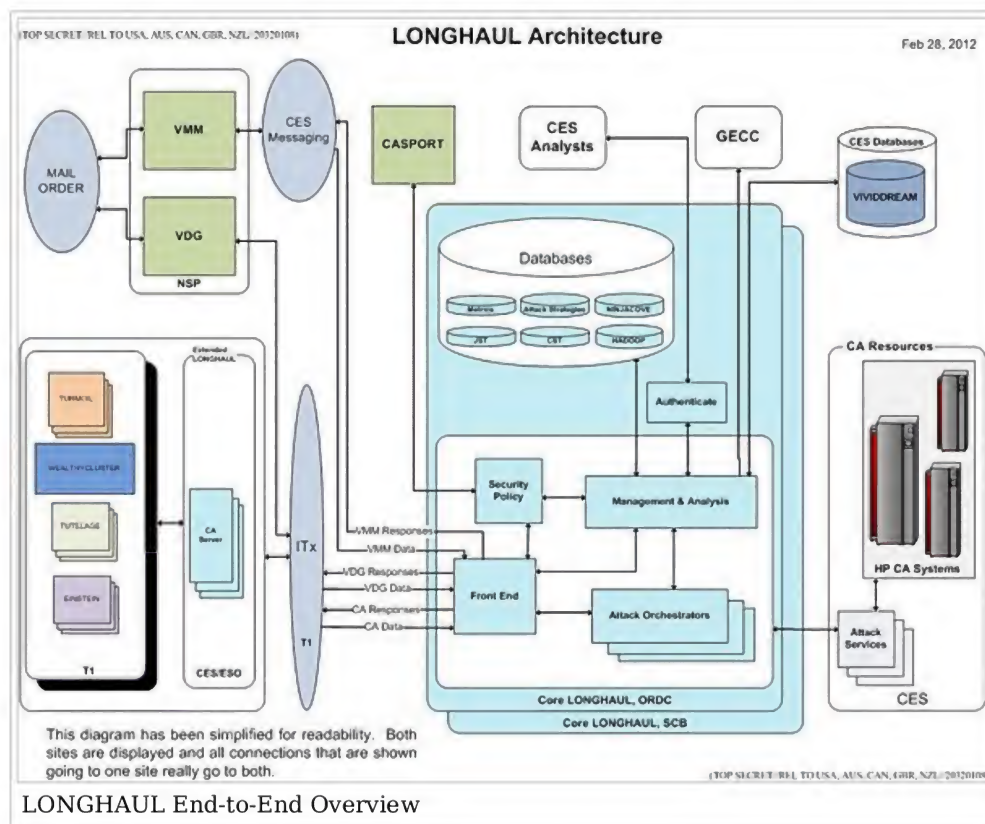
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(U//FOUO) LONGHAUL Overview

(U) General

(U) DataFlow and CONOP

(TS//SI//REL) The LONGHAUL system is composed of several components as shown in this End-to-End View. LONGHAUL receives cryptanalytic information (CA Data) from the field systems and passes information back to field systems using its **Front End**. The Front End validates the sender/receiver using **CASPORT** services. LONGHAUL contains **Attack Orchestration** components (one orchestrator for each distinct type of attack), and **Attack Service** components. Attack orchestration figures out what cryptanalytic processing should be applied for each piece of CA Data, and then initiates, and as needed manages, that processing. Attack service performs the cryptanalytic attack. Once the processing is complete, the result is returned to the attack orchestration component, information about the processing is "saved" for **Management and Analysis**, and then as appropriate the result is returned to the "requesting" CA Server. LONGHAUL accesses CES Databases for certain information needed for attack orchestration and attack services. LONGHAUL also provides an interface for CES Analysts that need access to information pertaining to the LONGHAUL processed data. LONGHAUL maintains its own internal databases for the management and control of its processing activities.



(TS//SI//REL) LONGHAUL (in Purge_Surge parlance) is a **Collection Store**, that is a "system that processes and/or retains collected SIGINT data items, and that permits access to those performing collection functions and limits access of those performing intelligence analysis". LONGHAUL maintains internal databases that contain Cryptanalytic "technical data", and LONGHAUL also exchanges Cryptanalytic "technical data" with other CES databases and with CES HPC resources that perform cryptanalytic attacks. This "technical data" includes recovered

keys, information about what crypt processing is appropriate, data needed for cryptanalytic attacks, as well as information retained to enable future cryptanalytic attacks. LONGHAUL does not store cipher data or ever have access to decrypted data. If the "technical data" passed to **Attack Service** components or CES databases contains information from the collected stream (as opposed to information about the collected stream such as SIGAD, DTOI), then appropriate Critical Identifying Information (CII) will be passed also. From a compliance perspective this is the system being "certified".

(TS//SI//REL) Field deployed collection systems and **CA Servers** (also known as **Extended LONGHAUL**) are shown on the left. A **CA Server** is the field CES component that runs **CA Services**. The terms CA Server or CA Services are used depending on the context (hardware/software). For information on CA Server deployments see the CES/DNCA wiki pages **CA Servers** ([REDACTED]), and for information on CA Server architecture see LONGHAUL/CA Server. The CA Server stores cipher data, and decrypts it based upon a key returned by LONGHAUL.

(S//SI//REL) LONGHAUL is a **High Availability** system using hardware at two geographically distributed locations to also provide a COOP capability. LONGHAUL uses the Application Messaging Framework **AMF** with the ISLANDTRANSPORT (ITx) transport and ISLANDHIDEAWAY (IH) integrity and privacy capabilities to send data between collection systems and LONGHAUL. The requestor of CA Services (the field deployed CA Server) never knows (or needs to know) which hardware is used to process its requests. LONGHAUL and the AMF manage the physical routing and failover behavior of the system.

(TS//SI//REL) LONGHAUL has a Service-Oriented, Java-Based Enterprise Architecture. It includes multiple coordinated software development efforts. Each **Attack Orchestrator** is a major development effort, as are the **Management and Analysis** and **Security and Policy** components. LONGHAUL also has a hardware acquisition component, and manages the interfaces and integration activities with TURMOIL/TURBULENCE (collection), and the High Performance Computing (HPC) activities of CES/T5. The LONGHAUL team is responsible for all phases of development, starting with requirements, thorough design, technology selection, development, integration, system test, and deployment. The team is also responsible for the system engineering and hardware design and acquisition to support a two-site, high-availability system.

(C//SI//REL) In July 2010, T1, T5 and CES signed an SLA 📄 for "the provisioning and support of Cryptanalytic (CA) Services within the TURBULENCE Passive Collection Suite (TU PCS)."

(U//FOUO) Attack Orchestration

(U//FOUO) POISONNUT

(TS//SI//REL) POISONNUT ([REDACTED]) is a Child LONGHAUL Project that enables Data Network Cipher (DNC) Recovery. Initial Customer Capability was released on September 30, 2009. LONGHAUL/POISONNUT (DNC) was determined by CES and T5 SPO to be IOC on 10 Jan. 2011.

(U//FOUO) SCARLETFEVER

(TS//SI//REL) SCARLETFEVER ([REDACTED]) is a Child LONGHAUL Project that enables Data Network Session Cipher (DNSC) Recovery. Initial Customer Capability was achieved in December 2010.

(U) Management and Analysis

(U) For this very high level view our diagram shows **Management and Analysis** as one block. This block contains many components and further details can be found on the **Software Architecture** page.

(U) Additionally, LONGHAUL has begun to create a set of web applications for Management

(Operations and Mission) and Mission Analysis which can be found here: [Web Applications List](#)

(U) Security and Policy

(U//FOUO) **SPAM** is our Security, Policy, and Adjudication Module which will be used to apply rules for sanitizing, filtering, and determining if a response should be sent to a particular client.

(U) Common

(S//SI//REL) All child projects share **LONGHAUL COMMON** components or services. This is not shown as a separate block on the diagram as all the components use **COMMON**.

(U) Interfaces (ICD)

(U) All Interfaces are described on the **ICD** wiki page. These include both the external interfaces (how a CA Server communicates with LONGHAUL) as well as the interfaces LONGHAUL uses with other CES systems.

(U) Design

(U) Architecture

(U//FOUO) Software and Hardware architecture discussions are available on the LONGHAUL Architecture page.

(U) High Availability

(S//SI//REL) LONGHAUL is a high availability system that makes use of Continuity of Operations (COOP) to meet availability requirements. The system is designed from both hardware and software perspectives to provide high availability, ensuring that key recovery services are always available. The two site deployment with equal processing capacity will meet the COOP requirement for the system. Each system is designed with redundant hardware and processes so that the system can survive any single component (hardware or software) failure. During normal operation, both systems will be operational and share the processing load. In the event of a single site failure, the second site will, within seconds, assume total processing responsibility, but at reduced capacity. The requestor of CA Services (the field deployed CA Server) never knows (or needs to know) which hardware is used to process its requests. CA Servers send data to LONGHAUL and receive responses from LONGHAUL using the AMF. LONGHAUL and the AMF manage the physical routing and failover behavior of the system.

(U//FOUO) For more detailed information, see Availability Analysis.

(U) AMF/ITx JMS Messaging

(U//FOUO) The use of a high capacity, low latency JMS messaging fabric is critical to the success of the LONGHAUL mission. LONGHAUL has worked closely with the Application Messaging Framework (AMF) team to design a fabric to support the LONGHAUL requirements.

(U) See **AMF / LONGHAUL Teaming** for more detailed information.

(U//FOUO) The collection site clients (CA Servers) will publish messages into the fabric with no knowledge of where the processing actually occurs. The fabric should support both active/active and active/passive processing modes. In active/active mode multiple sites would consume the same message, and manage the client response strategy. In active/passive, one site would consume a message, but in a failure mode, an alternate site would seamlessly pick up message

consumption.

(U) Deployment

(U) Hardware

(U//FOUO) LONGHAUL is composed of **almost identical hardware at two geographically distributed sites** - the Tordella Supercomputer Building (TSCB) at Fort Meade and Oak Ridge Data Center (ORDC) in Oak Ridge, Tennessee. The initial hardware configurations for TSCB and ORDC arrived in November 2009 and May 2010 respectively. The final configurations arrived in Jan 2011 at both sites. A system, termed "Hadoop Cluster" has also been purchased to produce analytics and store metrics for LONGHAUL. The Hadoop Cluster will reside at ORDC and is scheduled to be delivered in April 2011. CAVIUM is being considered for CA Server.

(U) For more detailed information, see Hardware Description and Schedule.

(U) Software Releases

(U//FOUO) LONGHAUL 3.4.0 was released on February 27, 2013. The release consists of:

- (U//FOUO) LONGHAUL_Common_3.4.1 - Full Release. Built on 12 February 2013.

- (U//FOUO) Added Capabilities
 - (TS//SI//REL) HEROICSAND improvements and initial metrics
 - (U//FOUO) Bug fixes and minor enhancements

- (U//FOUO) Included tracker artifacts v3.4.1 ([REDACTED]

- (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]

- (U//FOUO) POISONNUT 3.4.1 - Full Release. Built on 12 February 2013.

- (U//FOUO) Added Capabilities
 - (U//FOUO) Bug fixes and minor enhancements

- (U//FOUO) Included tracker artifacts v3.4.1 ([REDACTED]

- (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]

- (U//FOUO) SCARLETFEVER 3.4.1 - Full Release. Built on 12 February 2013.

- (U//FOUO) Added Capabilities
 - (TS//SI//REL) Fix PLATINUMRING timeouts for GALLANTWAVE
 - (TS//SI//REL) Increased capacity
 - (U//FOUO) Bug fixes and minor enhancements

- (U//FOUO) Included tracker artifacts v3.4.1 ([REDACTED]

- (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]

- (U//FOUO) WOLVERINESTAKE_3.4.1 - Full Release. Built on 12 February 2013.

- (U//FOUO) Added Capabilities
 - (U//FOUO) Bug fixes and minor enhancements

- (U//FOUO) Included tracker artifacts v3.4.1 ([REDACTED]

- (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]

- (U//FOUO) NINJACOVE_3.4.1 - Full Release. Built on 12 February 2013.
 - (U//FOUO) Added Capabilities
 - (U//FOUO) Bug fixes and minor enhancements
 - (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]
 - (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]
- (U//FOUO) JEDIMINDTRICK_3.4.1 - Full Release. Built on 12 February 2013.
 - (U//FOUO) Added Capabilities
 - (U//FOUO) Bug fixes and minor enhancements
 - (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]
 - (U//FOUO) Included tracker artifacts v3.4.0 ([REDACTED]
- LONGHAUL Version 3.4.0 Version Description Document ([REDACTED]

(U//FOUO) For more detailed information, see LONGHAUL Releases.

(U) Development

(U) Software/Schedules

(U) Four major releases are planned - 2009, 2010, 2011, 2012 - with minor releases in between as needed.

(U//FOUO) Release 1.0 - September 30, 2009 - Initial Customer Capability

(U//FOUO) Release 2.1 - December 30, 2010 - Initial Operational Capability

(U//FOUO) Release 2.2.0 - July 7, 2011 - DNSC Scaling

(U//FOUO) Release 2.3.0 - October 26, 2011 - Initial COOP Capability

(U//FOUO) Release 2.4.0 - January 11, 2012 - COOP and Scaling Capability

(U//FOUO) Release 2.5.0 - February 29, 2012 - CHAOTICSTORMTROOPER and JEDIMINDTRICK Webapps

(U//FOUO) Release 2.6.x - Mar. 31, 2012 - Availability Improvements and Cross Agency Pairing Prototype

(U//FOUO) Release 2.7.x - Apr. 30, 2012 - Availability and DNSC Performance Improvements

(U//FOUO) Release 2.8.x - May. 31, 2012 - FOC Release

(U//FOUO) Release 2.9.x - June 30, 2012 - TBD

(U//FOUO) Release 3.0.x - July 31, 2012 - TBD

(U//FOUO) Release 3.1.x - Aug. 31, 2012 - TBD

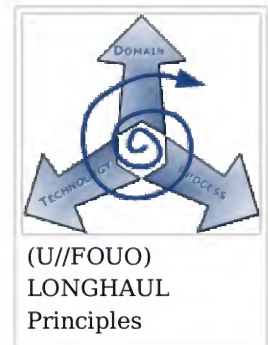
(U//FOUO) Release 3.2.x - Sept. 30, 2012 - TBD

Planned capability details can be found here [REDACTED]

(TS//SI//REL) Each LONGHAUL child project had its own schedule. Projects used to be planned quarterly "Phases" with monthly "Milestones".

(U) Development Principles, Processes, and Standards

(U//FOUO) LONGHAUL strives to use best practices in all its development activities, and is continually looking for ways to improve. We continue to refine our processes and want to share with and learn from other projects as well as the NSA Way. Please explore our wiki and "take" what you need. Conversely, if you have something that works for you, please contact us. POISONNUT was the first LONGHAUL child project, and the processes were initially developed then, but now all the child projects are using them. LONGHAUL Principles is a description of our development principles, and Aug 2010 Overview [REDACTED] is a summary brief of the project, process and tools we are using.



(U//FOUO) LONGHAUL Processes

(U//FOUO) Detailed information for each LONGHAUL process is available below.

(U) Requirements

(U//FOUO) Requirements Development - [REDACTED] - we use DOORS for maintaining all our requirements.

(U) Coding Standards/Reviews

(U//FOUO) Coding Standards - [REDACTED] - Project Coding Standards [REDACTED]

(U//FOUO) Code Reviews [REDACTED] LONGHAUL Code Review Process and Code Review Checklist

(U) Lessons Learned

(U//FOUO) Lessons Learned - [REDACTED] - Changes made as a result of development experience

(U) Configuration Management (and Metrics)

(U//FOUO) Configuration Management - [REDACTED] - Configuration Management, Change Management and Metrics

(U) Testing

(U//FOUO) Test Methodologies [REDACTED] - Testing Description

(U//FOUO) Unit Testing - [REDACTED] - Unit Test Guidelines [REDACTED]

(U//FOUO) Integration Testing - [REDACTED] - Testing with ISLANDTRANSPORT

(U//FOUO) System Testing - [REDACTED] - System Test plans and schedules.

(U) Working with NSA Way

(S//SI/REL) The LONGHAUL Project is an enthusiastic participant in the NSA Way ([REDACTED]). Because the LONGHAUL team is responsible for all phases of development, starting with requirements, through design, technology selection, development, integration, system test, and deployment, it uses a modified NSA Way Gate structure.

(U) Development and Management Tools

LONGHAUL relies on a variety of tools to support development and management tasks. The tools listed below have been assessed and found to be valuable

- (U//FOUO) Project Management [REDACTED] - including a bug and feature tracker [REDACTED] (restricted)
- (U//FOUO) Subversion Repository - available for browsing ([REDACTED]) (restricted)
- (U//FOUO) Maven Repository - an instance of Sonatype Nexus [REDACTED]
- (U//FOUO) Continuous Builds - an instance of Hudson ([REDACTED])
- (U//FOUO) CORALREEF - a test instance is running specifically for us on scubadiver2 ([REDACTED]) or coralreef-ua ([REDACTED]) .

(U) Technology

- (U) Integrating Java with C/C++
- (U) JMS Performance Testing
- (U) 0MQ Messaging
- (U) Terracotta Performance Testing [REDACTED]
- (U) HBase Performance Testing
- (U) Scala Research

(U) In-Memory Distributed Data Analysis of Alternatives (AOA)

- (U) The project is looking into several technologies for in-memory data caches with replication.
- (U) For more information, view the Distributed Data AOA

(U) BigData and Metrics Techniques

- (TS) LONGHAUL MapReduce 
- (TS) Hadoop Metrics Implementation

(U) TE6 Security, Compliance and Policy Enforcement

- (C//REL) LONGHAUL's position in the processing chain necessitates that it be prepared to deal with a whole host of security, policy and compliance enforcement issues, such as ensuring that the system is only accessed by authorized individuals, ensuring that the processing meets all legal requirements, resolving classifications from multiple sources,

ensuring that the recovered cryptovariables are only distributed to those entities that are authorized to receive them, ensuring that clients don't exceed some policy-defined limit on amount of work requested, and a whole host of other issues. This page seeks to capture the important security, compliance, and policy related scenarios LONGHAUL will address and document the design of their solutions.

- (U//FOUO) For details, see LONGHAUL Security, Compliance and Policy

(U) TS Certification & Accreditation

- (U//FOUO) This link contains information pertaining to LONGHAUL SSPs (System Security Plans)- LONGHAUL Certification & Accreditation
- LONGHAUL IAVA Patch Rollout Scheme

(U) Operations

(U//FOUO) LONGHAUL has been processing DNC data since Oct. 2009, and was declared IOC for DNC in Dec. 2010. Also, in Dec. 2010 an ICC (Initial Customer Capability) for DNSC was deployed. 24/7 System monitoring has been in place since Dec. 2010.

- (U//FOUO) Operations Manager [REDACTED] - responsible for the operations of LONGHAUL.
- (U//FOUO) **IMPORTANT:** Use the gDocUpdate Website [REDACTED] for the proper UNCLASSIFIED terms when talking over the black line.
- (U) LONGHAUL/Contact - For general contact information.
- (U) Exit Process [REDACTED] - lists the steps that need to be taken to ensure continued security when a person leaves the project.

(U) Tier 1 Support

(U) GECC - provides Tier 1 First Response/Help Desk support. The GECC attempt to resolve unexpected operational issues using well-defined procedures. If resolved by the GECC, then the details of the resolution are recorded and no further action is required. If the incident cannot be resolved using the remote capabilities at the Operations Center's disposal or within the pre-determined time threshold, the incident is escalated to Tier 2 for resolution.

- (U//FOUO) LONGHAUL Special Instructions - For COALCAR Incidents this SOP directs the GECC to use WebSA to restart failing processes on COALCAR.
- (U//FOUO) STOCKCAR Special Instructions - For STOCKCAR Incidents this SOP directs the GECC to use WebSA to restart failing processes on STOCKCAR.
- (U//FOUO) LONGHAUL System Support [REDACTED] - For LONGHAUL Incidents that require SA support for rebooting machines, etc. this URL directs the GECC to use the T3332 Infrastructure Operations page.

(U) Tier 2 Support

(U//FOUO) Tier 2 Support is provided by Maintenance/Operations Support (**LONGHAUL team**). Maintenance/Operations Support provides the day-to-day administration and support of production systems in accordance with documented, deployed configurations. Doing so usually requires specific knowledge about the associated servers, applications and how they interact. With respect to applications, this is referred to as "applications administration", as opposed to "systems administration" which is performed at the server hardware and operation systems (OS) level. Tier 2 also serves as the escalation point for problems not resolved at the Tier 1 level. Problems related to the internal workings of the software or are integration-related issues are escalated to the appropriate Tier 3 organization for resolution. Use the "Tier 2 Support" link

above for more information.

(U//FOUO) Troubleshooting Resources

- (U) LONGHAUL_Take_Home_Support_SOP - Contains troubleshooting instructions LONGHAUL Tier 2 support staff can take home.
- (U) Troubleshooting Help for Tier 2 Personnel - Page contains links to support pages for the various LONGHAUL components and possible solutions to previously seen issues.
- (U) Useful Support Links - A directory of useful support links. Contains troubleshooting instructions LONGHAUL Tier 2 support staff can take home.
- (U) Switching Operations - Page contains the procedures to take when switching operations to alternate site
- (U) LONGHAUL After Hours Beachhead - Location of after hours support
- (U) Creating a CES Help Ticket - Process for creating a CES help ticket for LONGHAUL issues.
- (U) Reporting Procedures - Process for reporting on Tier 2 issues.

(U//FOUO) Outage Process

- (U) For unexpected/emergency outages:
 - Send message to LH customers (see outage email list). Be sure to include how the system was affected and an estimate of how long it will take to restore the system.
 - If system remains unavailable 1 hour after troubleshooting began, switch operations to the alternate site (see switching operations).
 - If system continues to be unavailable after 90 minutes, inform T532 management. Be sure to include how the system was affected and an estimate of how long it will take to restore the system.
 - If system continues to be unavailable after 2 hours, inform T53 management. Be sure to include how the system was affected and an estimate of how long it will take to restore the system.
- (U) For scheduled outages, follow the normal outage procedure .

(U//FOUO) Contacting the GECC

- (U//FOUO) - The GECC director
- (U//FOUO) - The Turbulence desk where LONGHAUL support personnel are located.
- (U//FOUO) T3332 Infrastructure Operations (for reboots of system after-hours)

(U) Tier 3 Support

(U//FOUO) Tier 3 support is provided by Development Support (**LONGHAUL team**). Development Support resolves issues escalated from Tier 2 related to the internal workings of the software (i.e., requires "cracking open the code") or COTS/GOTS integration. These are break/fix activities, which are outside of typical development, and implementation activities (such as resource planning, project management, architecture, s/w development, initial implementation /integration/testing, etc.). Tier 3 support consists of:

- (U) Release Procedures - managing maintenance releases
- (U) Outage Procedures - Managing and Scheduling Outages using

(U) Site Deployments

(U) Site Deployments [REDACTED] - contains information about upcoming site deployments of CA Servers.

(U) Transition

(TS//SI//REL) Transitioning Life Cycle Support of LONGHAUL is contingent upon successful completion of FOC in September 2011. The system will transition to the following organizations:








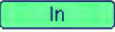



- HPC Integration and Production (T53 [REDACTED])
- Exploitation Solutions Office (ESO ([REDACTED]))
- Office of Target Pursuit (OTP [REDACTED])

(U//FOUO) Planning for this transition began in April 2010 and is ongoing.




(U//FOUO) For more detailed information, see Transition.

(U//FOUO) Team Members

Government Team Members/LONGHAUL

Name 	SID 	Function 	Affiliation 	Work Black Phone 	JSignout 
[REDACTED]		Project Lead	T5323	[REDACTED]	
		Operations Manager	T5323	[REDACTED]	
		Mission Assurance	T5323	[REDACTED]	
		Test Lead	T5323	[REDACTED]	
		Developer	C2DP Intern	[REDACTED]	

Contractor Team Members/LONGHAUL







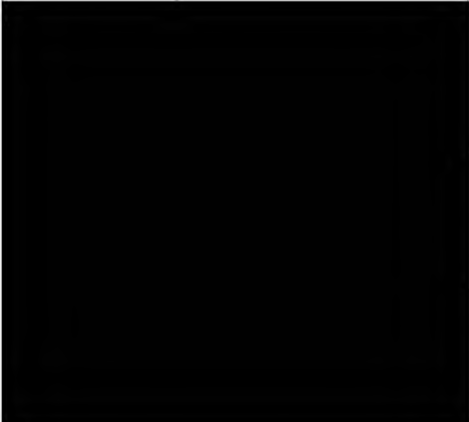
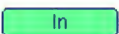
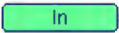

Name 	SID 	Function 	Affiliation 	Work Black Phone 	JSignout 
			Sotera		<div>In</div>
			Softtech Solutions		<div>In</div>
			Sotera		<div>GFTD</div>
			Sotera		<div>In</div>
			Sotera		<div>GFTD</div>
			Sotera		<div>In</div>
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			Sotera		<div>In</div>
			Sotera		<div>In</div>
			Sotera		<div>In</div>
			Sotera		<div>GFTD</div>
			Sotera		<div>GFTD</div>

	Developer	Sotera	In
	Developer	Sotera	In
	Developer	Sotera	In
	Developer	Sotera	In







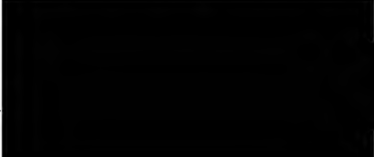
MIDRIFT Team Members

Name	SID	Function	Affiliation	Work Black Phone	JSignout
		Branch Manager	Govt		In
		Deputy Branch Manager	Govt		In
		Lead Developer	Govt		GFTD
		Developer	Govt		S/L (Sick)

Related Team Members




Name 	SID 	Function 	Affiliation 	Work Black Phone 	JSignout 
			McLendon		
		Program B T&E	Govt		
		Program B T&E	DigiFlight		

Other Useful Numbers


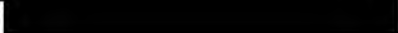
Name 	SID 	Function 	Affiliation 	Work Black Phone 	Work Secure 	comment 
GECC		T332 Global Enterprise Command Center	24/7 Enterprise Monitoring			

(U) See also



(S//SI//REL) The LONGHAUL team works with the following organizations:

- Digital Network Crypt Applications (S31322)
- Attack Services (S31241)
- Requirements and Thread Management (S313)
- CA Databases (T532 )
- Mission Capabilities (T1 )
- High Performance Computing Technology (T5 (/td/hpctp/), T5)

to develop, deploy and test all aspects of an end-to-end processing system. Team members are located in the OPS2A, NBP322, and NBP140.

- (U//FOUO) T5/S31243 - LONGHAUL - C2DP Tour Description
- (U//FOUO) Cryptanalytic Computer Network Operations Development Program (C2DP)
- (U//FOUO) LONGHAUL Glossary 
- (U//FOUO) LONGHAUL Frequently Asked Questions 
- (U//FOUO) Proposed LONGHAUL 2 Coverterms

(U) External links

- (U) The L03 Coverterm page ("go coverterm )
- (U) The Query a Coverterm ()

/coverterms.startingpage) form

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